CURRICULUM MAP (Long term plan)

SUBJECT: Computing **YEAR GROUP: 9**

	Cycle 1 **Autumn**	**Cycle 2** **Spring**	**Cycle 3** **Summer**
Substantive knowledge – Essential knowledge & conceptual understanding of the National Curriculum (Computing taxonomy)	**Delving into Data Science** Creating media Design and Development Effective use of tools Impact of technology **Representations going audio-visual** Creating media Computing systems Data and Information Effective use of tools Impact of technology	**Python Programming with sequences of data** Algorithms Computing systems Design and Development Data and Information Programming **Applying programming skill with physical computing** Algorithms Computing systems Design and Development Data and Information Effective use of tools Networks Programming	**Introduction to cybersecurity** Computing systems Design and Development Data and Information Effective use of tools Networks Programming **Media – Animations** Creating media Effective use of tools
Disciplinary knowledge - what skills are practiced?	**Delving into Data Science** Define data science Explain how visualising data can help identify patterns and trends in order to help us gain insights Use an appropriate software tool to visualise data sets and look for patterns or trends Recognise examples of where large data sets are used in daily life	**Python Programming with sequences of data** Write programs that display messages, receive keyboard input, and use simple arithmetic expressions in assignment statements Use selection (if-elif-else statements) to control the flow of program execution Locate and correct common syntax errors	**Introduction to cybersecurity** Explain the difference between data and information Critique online services in relation to data privacy Identify what happens to data entered online Explain the need for the Data Protection Act Recognise how human errors pose security risks to data

	Select criteria and use data set to investigate predictions Evaluate findings to support arguments for or against a prediction Define the terms 'correlation' and 'outliers' in relation to data trends Identify the steps of the investigative cycle Solve a problem by implementing steps of the investigative cycle on a data set Use findings to support a recommendation Identify the steps of the investigative cycle Identify the data needed to answer a question defined by the learner Create a data capture form Describe the need for data cleansing Apply data cleansing techniques to a data set Visualise a data set Analyse visualisations to identify patterns, trends, and outliers	Create lists and access individual list items Perform common operations on lists or individual items Use iteration (while statements) to control the flow of program execution Perform common operations on lists or individual items Perform common operations on strings or individual characters Use iteration (for statements) to iterate over list items Perform common operations on lists or strings Use iteration (for loops) to iterate over lists and strings Use variables to keep track of counts and sums Combine key programming language features to develop solutions to meaningful problems **Applying programming skill with physical computing** Describe what the micro:bit is List the micro:bit's input and output devices	Implement strategies to minimise the risk of data being compromised through human error Define hacking in the context of cyber security Explain how a DDoS attack can impact users of online services Identify strategies to reduce the chance of a brute force attack being successful Explain the need for the Computer Misuse Act List the common malware threats Examine how different types of malware causes problems for computer systems Question how malicious bots can have an impact on societal issues Compare security threats against probability and the potential impact to organisations Explain how networks can be protected from common security threats Identify the most effective methods to prevent cyberattacks **Media – Animations** Add, delete, and move objects Scale and rotate objects. Use a material to add colour to objects

	Draw conclusions and report findings **Representations going audio-visual** Describe how digital images are composed of individual elements Recall that the colour of each picture element is represented using a sequence of binary digits Define key terms such as 'pixels', 'resolution', and 'colour depth' Describe how an image can be represented as a sequence of bits Describe how colour can be represented as a mixture of red, green, and blue, with a sequence of bits representing each colour's intensity Compute the representation size of a digital image, by multiplying resolution (number of pixels) with colour depth (number of bits used to represent the colour of individual pixels) Describe the trade-off between representation size and perceived quality for digital images Perform basic image editing tasks using appropriate software and combine them in order to solve	Use a development environment to write, execute, and debug a Python program for the micro:bit Write programs that use the micro:bit's built-in input and output devices Write programs that use GPIO pins to generate output and receive input Write programs that communicate with other devices by sending and receiving messages wirelessly Design a physical computing artefact purposefully, keeping in mind the problem at hand, the needs of the audience involved, and the available resources Decompose the functionality of a physical computing system into simpler features Implement a physical computing project, while following, revising, and refining the project plan Implement a physical computing project, while following, revising, and refining the project plan	Add, move, and delete keyframes to make basic animations. Play, pause, and move through the animation using the timeline. Create useful names for objects Join multiple objects together using parenting. Use edit mode and extrude Use loop cut and face editing Apply different colours to different parts of the same model Use proportional editing Use the knife tool Use subdivision Add and edit set lighting Set up the camera Compare different render modes Create a 3–10 second animation. Render out the animation

	more complex problems requiring image manipulation Explain how the manipulation of digital images amounts to arithmetic operations on their digital representation Describe and assess the creative benefits and ethical drawbacks of digital manipulation (Education for a Connected World) Recall that sound is a wave Explain the function of microphones and speakers as components that capture and generate sound Define key terms such as 'sample', 'sampling frequency/rate', 'sample size' Describe how sounds are represented as sequences of bits Calculate representation size for a given digital sound, given its attributes Explain how attributes such as sampling frequency and sample size affect characteristics such as representation size and perceived quality, and the trade-offs involved		

	Perform basic sound editing tasks using appropriate software and combine them in order to solve more complex problems requiring sound manipulation Recall that bitmap images and pulse code sound are not the only binary representations of images and sound available Define 'compression', and describe why it is necessary		
Key questions (What is the learning about?)	**Delving into Data Science** Can I visualise my own data set to help spot any patterns or trends. Can I analyse large global data sets and visualisations How has data collection and storage changed with technological advances? Can I solve a problem by implementing the steps of the investigative cycle on a data set? Can I use my findings from the investigative cycle to support a recommendation? What are the methods of data collection?	**Python Programming with sequences of data** What is the general software life cycle for a computer program? How do functions provide modularity in my program? How do I identify and fix errors in my code? What is the purpose of testing code for robustness? Can I successfully create program code as a solution to a problem I have solved. **Applying programming skill with physical computing**	**Introduction to cybersecurity** What is the difference between data and information? What is the need for the data protection law and computer misuse act? What human errors pose a risk to data and how is this prevented? What strategies can be used to prevent network attacks? What are the impacts of security threats to organisations and individuals? **Media – Animations** Where is 3D animation used in the wider world? How is Blender interface used? How is keyframing used to make animations?

	What is data cleansing and how can unclean data cause problems when analysing data? **Representations going audio-visual** How are letters and numbers represented in computers? How are colours described in computers? Can I calculate the representation size of images and sound? How are digital images manipulated and what effect does it have? What components are used to capture and generate sound? Why would I use compression?	Can I recall the features of a microbit? Can I program the input and output features of a microbit? Can I program the microbit to work wirelessly? Can I program the microbit to solve a problem?	How do I name and parent objects then animate those parent objects? What are the basic tools and terminology for editing 3D models? Can I make a complex model and add different colours to the same object? Can I use appropriate lighting and set up the camera to enhance my model? What are the different rendering modes and how do these work?
Assessment Live marking is conducted throughout lessons with verbal feedback and feedback cards given out to students.	**Delving into data science** End of unit test End of unit practical assessment **Representation going audio visual** End of unit test	**Python Programming with sequences of data** End of unit test End of unit practical assessment **Applying programming skills in physical computing** End of unit test	**Introduction to cyber security** End of unit test **Media - Animations** End of unit practical assessment
Literacy (L), **Numeracy** (N), **Oracy** (O) **opportunities**	Microsoft Excel for mathematical calculations (N)	Problem solving and algorithmic thinking (N)	Understanding modern technological terminologies (L)

	Visualisation of data to identify patterns and trends (N) Looking at symbols used in place of language (L, N) Counting in computer units (N)		Presenting information suitable for audience and purpose (O)
Cross Curricular Opportunities	Science - John Snow investigation of cholera in 1854 Maths - Joseph Minard data visualisation and statistical graphs Art and design - key terms relating to digital images and how colours are made up (RGB)	Citizenship - computer laws, privacy laws, data laws, being safe online.	Business - the value of data Media - introduction to editing terminologies Drama & Media - film and image use of green screens. Design and Technology - introduction to Computer Animated design / 3D modelling animation
Super curriculum	KS3 IT & Computing Club Online programming tutorials: https://www.codecademy.com/learn/learn-python-3 20 Code Challenges: https://www.ocr.org.uk/Images/202838-20-code-challenges.pdf News Articles: https://www.quantamagazine.org/ Fiction Books: Ready player one Where futures end The six Non-Fiction Books: AI: Its nature and future Hello World		

	But how do It Know		
Careers	**Delving into data science** Data scientist (Lesson 1 and Logbook) **Representation going audio visual** Sound engineer (Lesson 1 and Logbook)	**Python Programming with sequences of data** Programmer / Coder (Lesson 1 and Logbook) **Applying programming skills in physical computing** Programmer / Coder Systems Engineer (Lesson 1 and Logbook)	**Introduction to cyber security** Cyber Security roles with GCHQ (Lesson 1 and Logbook) **Media - Animations** 2D, 3D or stop frame animator (Lesson 1 and Logbook)
Equality and Diversity Gender Disability Religion Race Sexuality	'I Belong Display' shows a variety computer scientists of different genders and from different race	'I Belong Display' shows a variety computer scientists of different genders and from different race	'I Belong Display' shows a variety computer scientists of different genders and from different race
Local Community Links			
British Values **British Values** Democracy The rule of Law Individual Liberty Mutual Respect and Tolerance of others SMSC Character Education	Students have awareness of Copyright and ownership and Managing online information Within lessons children have the opportunity to contribute to discussions, have their opinions heard, view other children's work and give them feedback. Students are encouraged to allow everyone to have their say on particular topics and also how to present different pieces of work. Children are taught about the implications of posting negative comments on social media and also the implications of cyber bullying. Children are taught how to use the Internet safely, at	Within lessons children have the opportunity to contribute to discussions, have their opinions heard, view other children's work and give them feedback. Students are encouraged to allow everyone to have their say on particular topics and also how to present different pieces of work. Children are taught about the implications of posting negative comments on social media and also the implications of cyber bullying. Children are taught how to use the Internet safely, at school and at home, and how to report any images/messages deemed to be inappropriate. Children are taught about how to leave a positive digital	Students can explain how contributors to social media may be 'social bots' Students can explain what malware is and give some examples of how it operates and what its impact could be on a device or user (e.g. viruses, trojans, ransomware) Students can explain how to manage security software (e.g. anti-virus, security patches, adware blockers) on devices and understand why regular updates are important Students can explain how and assess when more secure use may require more advanced password management (e.g. dual-factor authentication, regular rolling, security questions, CAPTCHA, biometrics) Students have awareness of Data protection law, Computer misuse act

	school and at home, and how to report any images/messages deemed to be inappropriate. Children are taught about how to leave a positive digital footprint and how this may affect them in later life. Children are encouraged to make choices, safe in the knowledge they are in a safe and supportive environment. The school provides boundaries for the children to make choices safely. When using the Internet to research different faiths and beliefs, children are encouraged to show levels of respect. Students are taught about their etiquette online and how to engage in an online community positively.	footprint and how this may affect them in later life. Children are encouraged to make choices, safe in the knowledge they are in a safe and supportive environment. The school provides boundaries for the children to make choices safely. When using the Internet to research different faiths and beliefs, children are encouraged to show levels of respect. Students are taught about their etiquette online and how to engage in an online community positively.	Within lessons children have the opportunity to contribute to discussions, have their opinions heard, view other children's work and give them feedback. Students are encouraged to allow everyone to have their say on particular topics and also how to present different pieces of work. Children are taught about the implications of posting negative comments on social media and also the implications of cyber bullying. Children are taught how to use the Internet safely, at school and at home, and how to report any images/messages deemed to be inappropriate. Children are taught about how to leave a positive digital footprint and how this may affect them in later life. Children are encouraged to make choices, safe in the knowledge they are in a safe and supportive environment. The school provides boundaries for the children to make choices safely. When using the Internet to research different faiths and beliefs, children are encouraged to show levels of respect. Students are taught about their etiquette online and how to engage in an online community positively.